will last for 500 000 years on Earth. In fact the Earth gets enough light to provide the world with electricity for years to come in one hour.

However, solar power is one of the most material-intensive forms of energy production. The large-scale use of solar energy, also getting photovoltaic cells, entails a huge increase in the demand for materials, labour resources, raw materials extraction, enrichment, materials and so on.

Yet electric energy, born by sunlight, is much more expensive than obtained by conventional methods. However scientists don't stop and we hope that the experiments conducted in pilot plants and stations, will help to solve not only technical, but also economic problems.

References:

1. «Нетрадиционные источники и методы преобразования энергии»: учебное пособие для вузов / Н.Н. Баранов;
2. «Нетрадиционные и возобновляемые источники энергии»: учебное пособие / Ю.Д. Сибикин, М.Ю. Сибикин;
3. «Нетрадиционные и возобновляемые источники энергии»: учебное пособие / Р.В. Городов, В.Е. Губин, А.С. Матвеев;
4. http://www.physbook.ru/index.php/%CE%EF%FB%F2_%D1%F2%EE%EB%E5%F2%EE%E2%E0_%C0.%C3.
5. http://www.testpilot.ru/espace/bibl/tm/1981/kes.html.
6. http://www.nt-ekoklimat.ru/products/solarpowerenergy.
7. http://ru.wikipedia.org/wiki/%D4%EE%EA%EE%ED.

**Gozhin, A.G., Yevseeva, A.M.**

**Future nowadays**

*National Research Tomsk Polytechnic University*.

In everyday life we don’t think about the future, but the future is now. How our world looked like twenty years ago? Only some people had mobile phones with monochrome screens, there was a tiny heavy TV without high-speed internet, YouTube and google. Now can you imagine what will happen in the next twenty years? Technologies are moving faster than we imagine.

One of the modern technologies that have changed the computer world greatly is virtual reality. Virtual reality can be characterized by two main devices – Oculus Rift and OMNI. Oculus Rift is a new virtual reality (VR) headset designed specifically for video games that will change the way you think about gaming forever. With an incredibly wide field of view, high resolution display, and ultra-low latency head tracking, the Rift provides a truly immersive experience that allows you to step inside your favorite game and explore new worlds like never before.

The Oculus Rift creates a stereoscopic 3D view with excellent depth, scale, and parallax. Unlike 3D on television or in a movie, this is achieved by presenting unique and parallel images for each eye. This is the same way your eyes perceive images in the real world, creating a much more natural and comfortable experience. The Oculus Rift provides an approximately 100° field of view, stretching the virtual world beyond your peripheral vision. Your view of the game is no longer boxed in on a screen and is only limited by what your eyes

can see. The combination of the wide field of view with head-tracking and stereoscopic 3D creates an immersive virtual reality experience [1].

Moreover, there is another development even more impressive than the previous one. It is the game controller OMNI. The Omni enables you to move naturally and freely in virtual worlds. The release of affordable head mounted displays and low-cost sensor technologies has brought the decades-old dream of true virtual reality closer than ever [2]. The Omni takes virtual reality to the next level – allowing anyone to stand up and traverse virtual worlds with the natural use of their own feet. The Omni is the first virtual reality interface for moving freely and naturally in your favorite game. Moving naturally in virtual reality creates an unprecedented sense of immersion that cannot be experienced sitting down.

Human augmentation is believed to be another modern technology that made a great contribution to the people's lives. It is generally used to refer to technologies that enhance human productivity or capability, or that somehow add to the human body. Modern advancements in many areas of IT have led to a greater variety of implants and other technologies that could be classed as human augmentation. Within the greater category of human augmentation technologies, some different classifications can be made. For example, there are devices and implants that contribute to more advanced sensory devices, such as cochlear implants. Then there are orthotics or limb devices that can enhance motion or muscle capability. Other types of human augmentation may work with specific sorts of IT resources, such as big data assets. Some tech companies are rumored to be working on these kinds of data-connecting devices that would link the human body up to outside sources of information, either visual or text-based, or both.

While many of the new options for human augmentation seem to be empowering and offering improvements to human health and quality of life, part of the scientific community has expressed concern about human augmentation tools built on powerful tech concepts like biotech and nanotechnology, which must be closely observed for safety and long-term potential ramifications [3].

Military organizations are now experimenting with a wide range of 1st generation human augmentation technologies, including exoskeletons that allow personnel to carry increased loads and perform at a higher level. These devices have the potential to be adapted for use in healthcare and many other industries. Elderly people could benefit from powered human augmentation technology, such as powered exoskeletons, that can be used to assist wearers with simple walking and lifting activities, improving the health and quality of life for aging populations.

New implantable brain-machine interfaces have been developed and are being tested that are demonstrating that directly bridging the gap between brain and prosthetics devices are becoming a reality – allowing prosthetic devices to be directly integrated with the user's body. Neuro-enhancement technology under development could also provide superior memory recall or speed of thought for humans. Think of the possibilities for the those suffering from some form of dementia.

Human augmentation technology will probably not begin to be widely available for at least 10-15 years. However, as the field continues to advance, some people may eventually choose to enhance their bodies, much as they do with cosmetic surgery today. The high cost of human augmentation technology may lead to the emergence of a two-tiered society of enhanced and non-enhanced people [4].

People get used to observe cyber-implants in sci-fi movies, but they exist now. Different parts of the body can be replaced with cyber implants nowadays. Embedding a chip in the head help you control a cyber-hand. Cyber-legs with lots of motors and sensors can com-

pletely copy the movement of your foot. Cyber-eyes have not been very developed yet, however they are likely to be used in near future.

One more great achievement of nowadays is robots. Robots have replaced humans in the assistance of performing those repetitive and dangerous tasks which humans prefer not to do, or are unable to do due to size limitations, or even those such as in outer space or at the bottom of the sea where humans could not survive the extreme environments. There are concerns about the increasing use of robots and their role in society. Robots are blamed for rising unemployment as they replace workers in some functions. The use of robots in military combat raises ethical concerns. The possibilities of robot autonomy and potential repercussions have been addressed in fiction and may be a realistic concern in the future.

Robotics is the branch of technology that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior, and/or cognition. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics [5]. Today, robotics is a rapidly growing field, as technological advances continue; research, design, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots do jobs that are hazardous to people such as defusing bombs, mines and exploring shipwrecks.

Furthermore, there are humanoid robots which can walk on uneven surfaces, climb stairs, talk, help with housework and do what men can’t do. A humanoid robot is a robot with its body shape built to resemble that of the human body. A humanoid design might be for functional purposes, such as interacting with human tools and environments, for experimental purposes, such as the study of bipedal locomotion, or for other purposes. In general, humanoid robots have a torso, a head, two arms, and two legs; though some forms of humanoid robots may model only part of the body, for example, from the waist up. Some humanoid robots may also have heads designed to replicate human facial features such as eyes and mouths. Androids are humanoid robots built to aesthetically resemble humans. Humanoid robots are used as a research tool in several scientific areas. Researchers need to understand the human body structure and behavior (biomechanics) to build and study humanoid robots [6].

Human cognition is a field of study which is focused on how humans learn from sensory information in order to acquire perceptual and motor skills. This knowledge is used to develop computational models of human behavior and it has been improving over time.

In conclusion it is necessary to mention that technology represents man’s attempt to make life easier due to the fact that technological advances improve people’s standard of living.

References:

1. Oculus Rift: Step Into the Game. URL: https://www.kickstarter.com/projects/1523379957/oculus-rift-step-into-the-game (date of access 5.04.2014).
2. Omni: Move Naturally in Your Favorite Game. URL: https://www.kickstarter.com/projects/1944625487/omni-move-naturally-in-your-favorite-game (date of access 5.04.2014).

3. What does Human Augmentation mean? URL: http://www.techopedia.com/definition/29306/human-augmentation (date of access 5.04.2014).
4. Robotics. URL: http://en.wikipedia.org/wiki/Robotics (date of access 5.04.2014).
5. Humanoid robot. URL: http://en.wikipedia.org/wiki/Humanoid_robot (date of access 5.04.2014).
6. Human Augmentation, Exoskeleton Technology & 'Open' Health . URL: http://www.openhealthnews.com/articles/2013/human-augmentation-exoskeleton-technology-open-health (date of access 5.04.2014).

**Grigoryev A.S., Shishkovskaya, Yu.V.**

## System Operator of the United Power System

*National Research Tomsk Polytechnic University*.

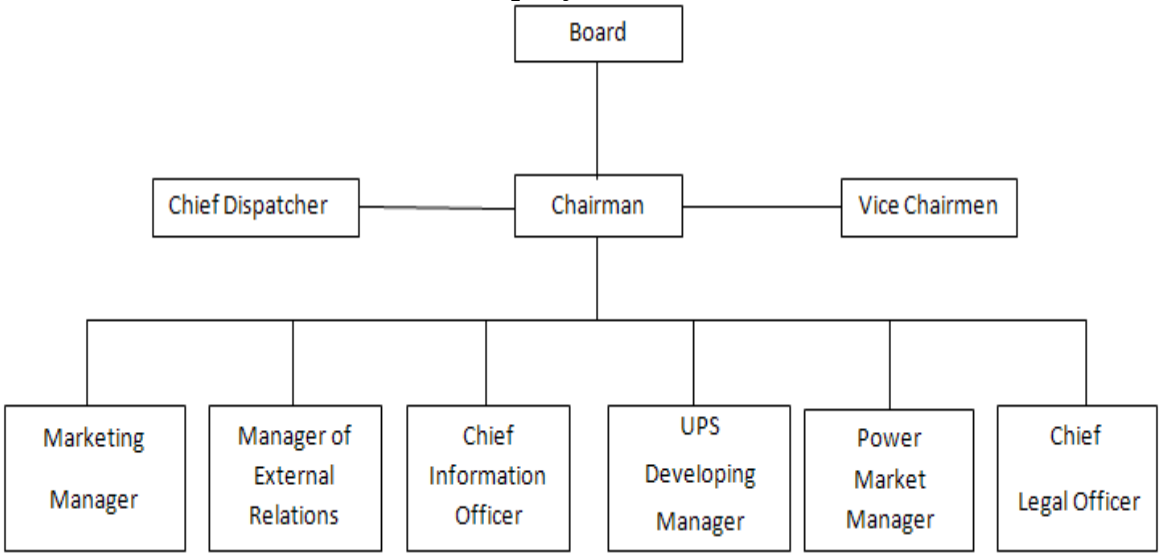
### Introduction

The open joint-stock company System Operator of the United Power System is a specialized organization that single-handedly performs centralized control of the Unired Power System of Russia and provides electricity dispatching services and operates a high voltage electricity transmission grid.

### Company history

Before 2002 energy control system consisted of Central Dispatch Office, 7 unified dispatching offices and regional dispatching offices. In 2002 a new administrative organization was established-System operator- Central Dispatch Office of United Power System which got functions of managing of the United Power System. In 2008 company changed its name to System operator of the United Power System. Nowadays the company is based in Moscow and has a work force of more than 8000 empoyees.

### Company Structure




The head of the company is the Chief Executive Officer.He is pesponsible to Board of Directors.Board of Directors is first of all responsible for ensuring that energy meets all its financial and legal obligations.

Managers of varios departments which are are vital to a company report directly to the CEO.These managers may be referred to as the management team.They are required to